REMARKS

Claims 10-16 are presently pending in the Application and those claims were renumbered, by the Examiner's amendment, in accordance with the telephone conversation on September 15, 2006 between the Examiner and the Applicant's attorney, Michael J. Bujold.

The Examiner rejects claims 12, 13 and 16 under 35 U.S.C. § 112, second paragraph, as being indefinite for the reasons noted in the official action. The rejected claims are accordingly amended, by the above claim amendments, and the presently pending claims are now believed to particularly point out and distinctly claim the subject matter regarded as the invention, thereby overcoming all of the raised § 112, second paragraph, rejections. The entered claim amendments are directed solely at overcoming the raised indefiniteness rejection(s) and are not directed at distinguishing the present invention from the art of record in this case. The Applicant therefore respectfully requests that the Examiner reconsider and withdraw all rejections of the claims under 35 U.S.C. 112.

The Examiner further rejects claims 10-13, 15 and 16 under 35 U.S.C. § 103(a), as being unpatentable over Hirozawa et al. `104 in view of Adam `694 for the reasons stated in the Office Action, and separately rejects claim 14 under 35 U.S.C. § 103(a), as being unpatentable over Hirozawa et al. `104 in view of Adam `694 for the reasons stated in the Office Action. The Applicant acknowledges and respectfully traverses both of the raised obviousness rejections in view of the following remarks.

It should first be noted that upon consideration of the Examiner's stated reasons for rejection of the claims under 35 U.S.C. § 103 and the cited prior art, independent claims 10 and 16 are amended to more explicitly point out and recite the fundamental distinctions between the present invention, as claimed, and the cited prior art. It will be noted, however, that the submitted claim amendments are fully supported by the specification and drawings of the Application as originally filed, as well as the original and first amended claims as filed, and that these amendments have not added any new subject matter to the specification or claims.

Now considering the present invention as recited in claims 10 and 16, it will be noted that claims 10 and 16 contain analogous limitations and recitations. As recited therein, the present invention is direct to a gear shifting system that includes a plurality of axially displaceable sliding sleeves where each sliding sleeve is fixed to and rotates with a main shaft

and engages with at least one idler wheel to shift the engaged idler wheel or wheels by axial displacements of the sliding sleeves.

According to the present invention as recited in claims 10 and 16, each sliding sleeve includes a circumferential recess formed by two opposing faces that are parallel to and spaced apart along the axis of rotation of the sliding sleeve and thus of the main shaft and the idler wheels and the shifting system further includes a plurality of adjusting units where each adjusting unit engages with the circumferential recess of a corresponding sliding sleeve to selectively displace the corresponding sliding sleeve along the main shaft, thus shifting the idler wheels. As recited in the claims, each adjusting unit includes a servo-motor having a motor shaft rotating about an axis perpendicular to the axis of rotation of the main shaft, and a pin that is mounted eccentrically on the motor shaft so as to have an axial movement along the axis of the main shaft as the motor shaft (6) rotates. That is, the eccentricity of the pin with respect to the axis of rotation of the motor shaft to which it is mounted will cause the movement of the pin as the motor shaft rotates to have a component along the axis of the main shaft, as well as a movement component perpendicular to the main shaft which, in turn, is along the axis of the recess of the corresponding sliding sleeve. The pin of each adjusting unit engages with the recess of the corresponding sliding sleeve and the movement component of the pin along the axis of the main shaft thereby causes selectable axial displacement of the corresponding sliding sleeve along the main shaft, and corresponding axial shifting movement of the associated idler wheel or wheels.

Next considering the teachings of Hirozawa et al. `104 and Adam `694 individually and then in combination with one another, Hirozawa et al. `104 describes a gear shift mechanism employing sliding sleeve members 13, 26 to axially shift the positions of gear wheels along a main shaft 11. According to Hirozawa et al. `104, the shifting operations of the sliding sleeve members 13, 26 and thus of the gear wheels is synchronized by driving the axial movement of all of the sliding sleeve members 13, 26 from a single cam plate 41 that is rotated by a servo motor and that has a shifting pattern groove 68, 69 for each sliding sleeve member 13, 26. The axial position and movement each sliding sleeve member 13, 26 is driven by a corresponding fork member 72, 73 that is mounted to a corresponding pin 70, 71 that engages the corresponding groove 68, 69 in the single cam plate 41, so that each sliding sleeve member 13, 26 is driven to a sequence of axial positions as the motor turns the cam plate 41.

It is, therefore, apparent that there are a number of very fundamental distinctions between the present invention, as recited in claims 10 and 16, and the gear shift mechanism described by Hirozawa et al. `104. For example, Hirozawa et al. `104 describes the mechanism that links the single servo motor and each sliding sleeve member 13, 26 and comprises a cam plate (41) having a shift pattern groove 68, 69 for each sliding sleeve member 13, 26, a pin 70, 71 for and corresponding to each sliding sleeve member 13, 26, where each pin 70, 71 engages into and moves along a corresponding shift pattern groove 68, 69, and a fork member 72, 73 attached to the pin 70, 71.

Hirozawa et al. `104 therefore teaches the use of a complex, multi-part, multi-stage linking mechanism to connect the servo motor to the sliding sleeve members 13, 26 and to convert the rotational motion of the servo motor into an axial, linear motion of each sliding sleeve member 13, 26 along the axis of rotation of the sliding sleeve members 13, 26 and the main shaft (11).

In fundamental contrast from Hirozawa et al. `104, and as recited in the claims, the sliding sleeve adjustment mechanism of the present invention includes, for each sliding sleeve, only a pin mounted eccentrically to the shaft of a corresponding servo motor and a circumferential recess in the rim of the sliding sleeve that is engaged by the pin of the corresponding servo motor, so that the rotational motion of the servo motor is converted directly into an axial linear motion of the sliding sleeve.

In this regard, it must be noted that the eccentric rotation of each pin is generally circular; that is, the pin moves with a motion component that is axial along the axis of rotation of the shifting sleeve and the main shaft and with a motion component that is perpendicular to the axis of rotation of the shifting sleeve and the main shaft. As described, the axial motion component of the eccentric pin rotation engages with the faces of the sides of the circumferential recess in the sliding sleeve to move the sliding sleeve axially. The motion of the pin that is perpendicular to the axis of rotation of the sliding sleeve and its shaft, however, is accommodated by the circumferential recess in the sliding sleeve because the motion of the pin perpendicular to the axis of the sliding sleeve is in the direction along the recess, allowing the pin to move back and forth along the recess.

In complete contrast from the teachings of Hirozawa et al. `104, the sliding sleeve driving mechanism of the present invention is not a complex, multi-part, multi-stage linking

mechanism but is instead a one stage direct drive mechanism that converts the rotation of the motor shaft and the eccentric rotation of the pin about the motor shaft directly into linear axial motion of the sliding sleeve. It is therefore the Applicant's position that the present invention, as recited in claims 10 and 16, is fully and patentably distinguished over and from Hirozawa et al. `104 under 35 U.S.C. § 103 for this reason alone.

In still further fundamental distinction between the present invention and Hirozawa et al. `104, however, it must be noted that Hirozawa et al. `104 teaches that it is an absolute requirement that all of the sliding sleeve members be driven by a single motor and a single cam plate having all of the shift pattern grooves desired for the entire shift mechanism. It is therefore impossible in the Hirozawa et al. `104 mechanism to adjust the shift pattern of even a single one of the sliding sleeve members without replacing the entire cam plate with a new cam plate having shift pattern grooves corresponding to the desired changes in the shift pattern.

In complete and fundamental contrast from Hirozawa et al. `104, the shift mechanism of the present invention not only does not employ cam plates at all, but includes a separate servo motor actuator mechanism for each sliding sleeve, so that the shift motions of each of the sliding sleeves is controlled solely by the rotation of the corresponding motor and can be adjusted or changed independently and separately from each of the other sliding sleeves.

Further in this regard, it must be noted that the number of sliding sleeve members and thus the number of shifting gear wheels that can be controlled by the Hirozawa et al. `104 mechanism is determined and significantly limited by the number of shift pattern grooves that can be implemented on the single cam plate without interference between the shift pattern grooves or the motion of the shifting fork mechanisms. This fundamental limitation is clearly illustrated when it is noted that Hirozawa et al. `104 describes a gear shift mechanism that is capable of controlling only two sliding sleeve members.

Again, however, in fundamental contrast from Hirozawa et al. `104, the use in the gear shift mechanism of the present invention of a separate servo motor actuator mechanism for each sliding sleeve allows the shift mechanism of the present invention to control any number of sliding sleeves and gear wheels.

It is, therefore, the Applicant's position that the present invention, as recited in claims 10 and 16, is fully and patentably distinguished over and from Hirozawa et al. `104 under 35 U.S.C.

§ 103 for the above discussed reasons and the Applicant accordingly respectfully requests that the Examiner reconsider and withdraw all rejections of claims 10 and 16 over Hirozawa et al. `104 under the requirements and provisions of 35 U.S.C. 103.

As claims 11-15 all dependent from claim 10, and thereby incorporate all of the limitations and recitations of claim 10 by dependency, the Applicant's respectfully submits that claims 11-15 are fully and patentably distinguished over and from Hirozawa et al. `104 under 35 U.S.C. § 103 for at least the same reasons that claim 10 is patentably distinguished over Hirozawa et al. `104. The Applicant accordingly respectfully requests that the Examiner reconsider and withdraw all rejections of claims 11-15 over Hirozawa et al. `104 under the requirements and provisions of 35 U.S.C. § 103 and allow claims 11-15 as well.

Therefore next considering the teachings of Adam `694, the reference relates to a gear shift mechanism employing a plurality of sliding gear clocks 12, 14, 16 to axially shift the positions of gear wheels along a shaft 8. According to Adam `694, the axial position and movement each sliding gear clocks 12, 14, 16 is driven by a corresponding shifting fork 18, 20, 22 where the shifting forks are rotatably mounted on corresponding crank arms 24, 26, 28 where each crank arm is mounted on a corresponding spindle 30, 32, 34. The lower ends of two of the spindles 32, 34 engage and travel in corresponding shift pattern grooves 62, 64 in corresponding cam plates 56, 58 that are rotated by a corresponding motor44, 46 and a third spindle 30 is rotatingly driven by an actuating level 40 that, in turn, is driven by a pin 68 that engages and travels in a shift pattern groove 60 in a third cam plate 54 that is rotated by a corresponding motor 42.

The gear shift mechanism described by Adam `694 is, therefore, very similar to that described by Hirozawa et al. `104, except that each sliding block is independently driven by a separate motor, cam plate with a single shift pattern groove, spindle and lever mechanism, rather than having all of the sliding sleeve members driven from a single motor and cam plate with multiple shift pattern grooves.

Like Hirozawa et al. `104, therefore, Adam `694 teaches the use of a complex, multi-part, multi-stage linking mechanism to connect each motor to the corresponding sliding block and to convert the rotational motion of the motor into an axial, linear motion of the sliding block along the axis of rotation of the sliding block and the shaft it is mounted onto.

In fundamental contrast from Adam `694, therefore, and as with the teachings of Hirozawa et al. `104, the sliding sleeve adjustment mechanism of the present invention includes, for each sliding sleeve and as recited in the claims, only a single pin mounted eccentrically to the shaft of a corresponding servo motor and a circumferential recess in the rim of the sliding sleeve that is engaged by the pin of the corresponding servo motor, so that the rotational motion of the servo motor is converted directly into an axial linear motion of the sliding sleeve.

In complete contrast from the teachings of Adam `694, therefore, and again as with the teachings of Hirozawa et al. `104, the sliding sleeve driving mechanism of the present invention is not a complex, multi-part, multi-stage linking mechanism but is instead a one stage direct drive mechanism that converts the rotation of the motor shaft and the eccentric rotation of the pin about the motor shaft directly into linear axial motion of the sliding sleeve.

In further fundamental contrast from Adam `694, it must be noted that the shift pattern and motion of each sliding block in Adam `694 is controlled by a combination of the rotation of the corresponding motor and the shape of the shift pattern groove in the corresponding cam plate. As such, change to or adjustments in the shift pattern motion of any of the sliding blocks will require the replacement of the cam plate and its shift pattern groove by another cam plate with another shift pattern groove. In fundamental contrast from Adam `694, however, and because the shift mechanism of the present invention does not employ cam plates at all but instead controls the motion and position of each sliding sleeve directly by the rotation of the corresponding motor. Because of this basic difference between the present invention and Adam `694, the shift mechanism of the present invention can control, adjust or modify the shift motions of each of the sliding sleeves directly and independent of all of the other sliding sleeves without the need to replace one or more cam plates with other cam plates.

It is therefore the Applicant's position that the present invention, as recited in claims 10 and 16, is fully and patentably distinguished over and from Adam `694 under 35 U.S.C. § 103 for the above discussed reasons and the Applicant accordingly respectfully requests that the Examiner reconsider and withdraw all rejections of claims 10 and 16 over Adam `694 under the requirements and provisions of 35 U.S.C. § 103 and allow claims 10 and 16.

As claims 11-15 all dependent from claim 10, and thereby incorporate all of the limitations and recitations of claim 10 by dependency, the Applicant's respectfully submits that

claims 11-15 are fully and patentably distinguished over and from Adam `694 under 35 U.S.C. 103 for at least the same reasons that claim 10 is patentably distinguished over Adam `694. The Applicant accordingly respectfully requests that the Examiner reconsider and withdraw all rejections of claims 11-15 over Adam `694 under the requirements and provisions of 35 U.S.C. § 103 and allow claims 11-15 as well.

Therefore next considering the combination of Hirozawa et al. `104 in view of Adam `694, it is first the Applicant's position that it would not be obvious to one of skill in the arts to combine the teachings of Hirozawa et al. `104 with the teachings of Adam `694. Given that Hirozawa et al. `104 and Adam `694 are similar in that both describe gear shift mechanisms using axially sliding sleeves to adjust the positions of gear wheels, and given that employ a complex, multi-part, multi-stage linking mechanism involving cam plates with shift pattern grooves and spindle and lever linkages to convert the rotation of a motor shaft into linear axial motion of a sliding sleeve, the two systems still have very significant fundamental differences and contradictions. For example, Hirozawa et al. `104 states absolutely that all of the sliding sleeves must be *driven together* and from a single motor and single cam plate having a shift pattern groove for each sliding sleeve, while Adam `694 teaches that each of the sliding blocks must be *driven from a separate motor and cam plate* having a single shift pattern groove.

It is therefore apparent that Hirozawa et al. `104 and Adam `694 teach directly away from and in contradiction to one another in this very fundamental aspect of their designs. As such, and for at least this reason, it is the Applicant's position that one of skill in the relevant arts would not look to a combination of these fundamentally and diametrically opposed teachings, but would instead be far more likely to select teachings from only one of these references.

Assuming, however, purely for the purposes of discussion and without any agreement, admission and/or concurrence with such a combination, that Hirozawa et al. `104 and Adam `694 are properly combinable with one another, it is apparent that they would be combined only with respect to certain elements of their respective teachings. For example, Hirozawa et al. `104 and Adam `694 are compatible and non-contradictory essentially only with regard to the common teaching of complex, multi-part, multi-stage linking mechanisms involving cam plates with shift pattern grooves and spindle and lever linkages to convert the rotation of a motor shaft into linear axial motion of a sliding sleeve. While a combination of the teachings

might also be achieved with respect to some relatively minor aspects of their teachings where one of skill in the arts could selected some alternative element of one or the other teaching with conflict or contradiction, such combinations would still not each or suggest the present invention to one of ordinary skill in the arts under the requirements and provisions of 35 U.S.C. § 103. For example, one of skill in the arts possible could select either the fork structure of Hirozawa et al. `104 or the fork structure of Adam `694 without encountering prohibitive conflicts, but this feature is not a core aspect of the present invention.

Regardless of the combination to be made from combining the teachings of Hirozawa et al. `104 and Adam `694, therefore, the result would be a teachings of a gear shift mechanism employing complex, multi-part, multi-stage linking mechanisms involving cam plates with shift pattern grooves and spindle and lever linkages to convert the rotation of a motor shaft into linear axial motion of a sliding sleeve. There is no combination of Hirozawa et al. `104 and Adam `694 that will teach or even suggest a gear shift mechanism of the present invention, as recited in the pending claims, of a one stage direct drive mechanism that converts the rotation of the motor shaft and the eccentric rotation of the pin about the motor shaft directly into linear axial motion of the sliding sleeve.

It is, therefore, the Applicant's position that the present invention as recited in claims 10 and 16 is fully and patentably distinguished over and from Hirozawa et al. `104 and Adam `694 and any permissible combination of Hirozawa et al. `104 with Adam `694, under 35 U.S.C. § 103, for the above discussed reasons. The Applicant accordingly respectfully requests that the Examiner reconsider and withdraw all rejections of claims 10 and 16 over Hirozawa et al. `104 and Adam `694, and all permissible combinations of Hirozawa et al. `104 with Adam `694 under the requirements and provisions of 35 U.S.C. § 103.

As claims 11-15 all dependent from claim 10, and thereby incorporate all of the limitations and recitations of claim 10 by dependency, the Applicant's respectfully submits that claims 11-15 are fully and patentably distinguished over and from Hirozawa et al. `104 and Adam `694 under 35 U.S.C. § 103 for at least the same reasons that claim 10 is patentably distinguished over Hirozawa et al. `104 and Adam `694. The Applicant accordingly respectfully requests that the Examiner reconsider and withdraw all rejections of claims 11-15 over Hirozawa et al. `104 and Adam `694 under the requirements and provisions of 35 U.S.C. § 103 and allow claims 11-15 as well.

If any further amendment to this application is believed necessary to advance prosecution and place this case in allowable form, the Examiner is courteously solicited to contact the undersigned representative of the Applicant to discuss the same.

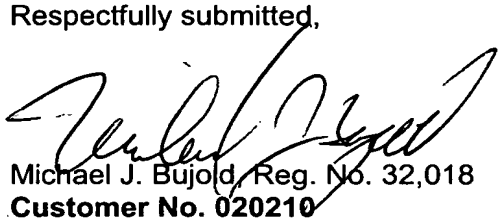
In view of the above amendments and remarks, it is respectfully submitted that all of the raised rejection(s) should be withdrawn at this time. If the Examiner disagrees with the Applicant's view concerning the withdrawal of the outstanding rejection(s) or applicability of the Hirozawa et al. `104 and/or Adam `694 references, the Applicant respectfully requests the Examiner to indicate the specific passage or passages, or the drawing or drawings, which contain the necessary teaching, suggestion and/or disclosure required by case law. As such teaching, suggestion and/or disclosure is not present in the applied references, the raised rejection should be withdrawn at this time. Alternatively, if the Examiner is relying on his/her expertise in this field, the Applicant respectfully requests the Examiner to enter an affidavit substantiating the Examiner's position so that suitable contradictory evidence can be entered in this case by the Applicant.

In view of the foregoing, it is respectfully submitted that the raised rejection(s) should be withdrawn and this application is now placed in a condition for allowance. Action to that end, in the form of an early Notice of Allowance, is courteously solicited by the Applicant at this time.

The Applicant respectfully requests that any outstanding objection(s) or requirement(s), as to the form of this application, be held in abeyance until allowable subject matter is indicated for this case.

In the event that there are any fee deficiencies or additional fees are payable, please charge the same or credit any overpayment to our Deposit Account (Account No. 04-0213).

Respectfully submitted,



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